# AREAS OF CRITICAL ENVIRONMENTAL CONCERN APPENDIX

## INTRODUCTION

This appendix provides an assessment of the areas nominated by the BLM and the public as areas of critical environmental concern and the evaluation of those nominations. A total of 18 nominations were evaluated (see table 49). These areas were evaluated according to BLM Manual 1613 to determine if they met the relevance and importance criteria described below.

## EVALUATION PROCESS

**Relevance:** An area meets the "relevance" criteria if it contains one or more of the following:

1. Significant historic, cultural or scenic values including rare or sensitive archeological resources and religious or cultural resources important to Native Americans.

2. Fish and wildlife resources including habitat for endangered, sensitive or threatened species, or habitat essential for maintaining species diversity.

3. Natural process or systems including endangered, sensitive, or threatened, plant species; rare, endemic, or relic plants or plant communities which are terrestrial, aquatic, or riparian, or rare geological features.

4. Natural hazards including avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs.

**Importance:** Value, resource, system, procedures, or hazard described above must have substantial significance and values characterized by one or more of the following.

1. More than locally significant qualities.

2. Qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.

3. Recognized as warranting protection to satisfy national priority concerns or to carry out the mandates of Federal Land Policy and Management Act.

4. Qualities which warrant highlighting to satisfy public or management concerns about safety and public welfare.

5. Poses a significant threat to human life and safety or to property.

**Areas To Be Considered:**

1. Existing areas of critical environmental concern are subject to reconsideration and must be reviewed.

2. Areas recommended for areas of critical environmental concern consideration.

a. External Nominations: Any public (group or person) or other agency may nominate. No formal or special procedures required.

b. Internal Nominations: BLM personnel recommend areas which appear to meet the relevance and importance criteria.

3. Areas identified at any time through inventory and monitoring.

4. Adjacent designations or other federal and state agencies must be reviewed.

**Data On Relevance and Importance:** An interdisciplinary team evaluates each area to determine if it meets both the relevance and importance criteria. Evidence of relevance and importance may be gathered from BLM or other sources.

If an area does not meet the criteria, or special management attention is not needed, analysis supporting that conclusion is incorporated in the resource management plan and environmental impact statement and the nomination is not considered as a potential area of critical environmental concern. If an area does meet both the relevance and importance criteria and requires special management attention, the nomination is a potential area of critical environmental concern.

**TABLE 49**
**AREAS OF CRITICAL ENVIRONMENTAL CONCERN NOMINATIONS**

| Name | Reason | Public Acres | Relevance | Importance | Need Special Mgmt. Attention |
|---|---|---|---|---|---|
| Big Sheep Mountain | Cultural Resources | 360 | Yes | Yes | Yes |
| Hoe Site | Cultural Resources | 144 | Yes | Yes | Yes |
| Jordan Bison Kill | Cultural Resources | 160 | Yes | Yes | Yes |
| Lewis and Clark National Historic Trail | Cultural Resources | 330 | Yes | Yes | No |
| Powder River Depot | Cultural Resources | 1,386 | Yes | Yes | Yes |
| Seline Site | Cultural Resources | 80 | Yes | Yes | Yes |
| Smoky Butte | Geology | 80 | Yes | Yes | Yes |
| Ash Creek Divide | Paleontological Resources | 7,931 | Yes | Yes | Yes |
| Bug Creek | Paleontological Resources | 3,840 | Yes | Yes | Yes |
| Hell Creek | Paleontological Resources | 19,169 | Yes | Yes | Yes |
| Sand Arroyo | Paleontological Resources | 9,056 | Yes | Yes | Yes |
| Limber Pine | Unique Vegetation | 3,212 | No | No | No |
| Ten Mile Creek | Riparian | 1,219 | Yes | No | No |
| Bald Eagle | Nests | 0 | Yes | Yes | No |
| Black-footed Ferret Reintroduction Area | Wildlife | 11,166 | Yes | Yes | Yes |
| Fox Creek | Fisheries | 240 | No | No | No |
| Least Tern | Nests | 0 | Yes | Yes | No |
| Piping Plover Site | Piping Plover | 16 | Yes | Yes | Yes |

# NOMINATIONS

**BIG SHEEP MOUNTAIN:** Nominated for unique cultural values.

**Relevance Criteria:** This site meets relevance criterion 1 as a significant cultural resource property. Significance is defined as being both eligible to the National Register of Historic Places, and through the development of a cultural resource management plan being eligible for allocation to conservation use. This significance is derived from the site's unique properties and potential to contribute important scientific information on nearly the full range of cultural traditions from the Paleo Indian period to the Late Plains Archaic period.

**Importance Criteria:** This site meets the importance criteria 1, 2, and 3. It possesses information that is regionally significant, and is fragile, sensitive, irreplaceable, unique, and vulnerable to vandalism and adverse change. Natural or man-caused changes could result in the loss of significant scientific data. In addition, the site warrants being allocated to conservation use, carrying out the mandates of cultural resource protection within Federal Land Policy and Management Act and the cultural resource management planning system.

Special management attention is needed to preserve the buried deposits for maximum value to the scientific community.

**Summary:** This site (24PE210) qualifies as an area of critical environmental concern under the relevance and importance criteria. The site measures 360 acres in size and is considered eligible for the National Register of Historic Places. The site is in T. 15 N., R. 48 E., sec. 28, 29, 32, and 33 and is considered significant for its full range of cultural periods over a period of some 10,000 years. The site contains important information on prehistory and history of the Native American in the plains environment. A cultural resource management plan is proposed for development for this site and will take the place of an area of critical environmental concern activity plan. The cultural resource management plan, when completed, will allocate the site to conservation use.

BLM management objectives should involve the long-term conservation of this site for future generations to study and enjoy. Specific research questions could be formulated whereby artifact and records from the site could be studied and used to demonstrate a number of prehistoric activities that were present or conducted at the site.

**HOE SITE:** Nominated for unique cultural values.

**Relevance Criteria:** This site meets relevance criterion 1 as a significant cultural resource property. Significance is defined as being both eligible to the National Register of Historic Places, and being eligible for allocation to conservation use through the development of a cultural resource management plan. This significance is derived from the site's unique properties and potential to contribute important scientific information on possible agricultural traditions from the late prehistoric period relating to the Middle Missouri tradition.

**Importance Criteria:** This site meets importance criteria 1, 2, and 3. It possesses information that is regionally significant, and is fragile, sensitive, irreplaceable, unique, and vulnerable to vandalism and adverse change. Natural or man-caused changes could result in the loss of significant scientific data. In addition, the site warrants being allocated to conservation use, carrying out the mandates of cultural resource protection within Federal Land Policy and Management Act and the cultural resource management planning system.

It is important that buried deposits be preserved to be of maximum value to the scientific community. This need for preservation necessitates special management attention.

**Summary:** This site (24PE263) qualifies as an area of critical environmental concern under both the relevance and importance criteria. This site measures some 144 acres in size and has been determined eligible for the National Register of Historic Places. The site is in T. 10 N., R. 51 E., sec. 3 and is significant for late prehistoric agricultural subsistence strategies and an associated habitation site. This site represents the most-western findings of possible agricultural practices of the middle Missouri tradition. It contains important information on prehistory of the Native American in the plains environment. A cultural resource plan is proposed for development for this site and will take the place of an area of critical environmental concern activity plan. The cultural resource management plan, when completed, will allocate the site to conservation use.

BLM management objectives should involve the long-term conservation of this site for future generations to study and enjoy. Specific research questions could be formulated whereby artifact and records from the site could be studied and used to demonstrate a number of prehistoric activities that were present or conducted at the site.

**JORDAN BISON KILL SITE:** Nominated for unique cultural values.

**Relevance Criteria:** This site meets relevance criterion 1 as a significant cultural resource property. Significance is defined as being both eligible to the National Register of Historic Places, and being eligible for allocation to conservation use through revision of the existing cultural resource management plan. This significance is derived from the site's unique properties and potential to contribute important scientific information on bison procurement and subsistence strategies from the late prehistoric period.

**Importance Criteria:** This site meets the importance criteria 1, 2, and 3. This site possesses information that is regionally significant, and is fragile, sensitive, irreplaceable, unique, and vulnerable to vandalism and adverse change. Natural or man-caused changes could result in the loss of the site's significant scientific data. In addition, the site warrants being allocated to conservation use, carrying out the mandates of cultural resource protection within Federal Land Policy and Management Act and the cultural resource management planning system. Special management attention is needed to preserve the site's buried deposits, for maximum value to the scientific community.

**Summary:** This site (24GF271) qualifies as an area of critical environmental concern under both the relevance and importance criteria. This site is 240 acres and is considered eligible for the National Register of Historic Places. The site is in T. 18 N., R. 38 E., sec. 24. The site is significant for late prehistoric period bison kill procurement and subsistence strategies and associated habitation and processing site. The site contains important information on prehistory of the Native American in the plains environment. The site has a cultural resource management plan that would be updated and would take the place of an area of critical environmental concern activity plan. The site will be allocated to conservation use.

BLM management objectives should involve the long-term conservation of this site for future generations to study and enjoy. Specific research questions could be formulated whereby artifact and records from the site could be studied and used to demonstrate a number of prehistoric activities that were present or conducted at the site.

**LEWIS AND CLARK NATIONAL HISTORIC TRAIL:** Nominated for association with unique historic events.

**Relevance Criteria:** The Lewis and Clark National Historic Trail meets the relevance criteria for being a nationally significant historic and cultural resource. Approximately 30 miles of public land is located along the trail. The largest contiguous amount of public land along the trail is 4 miles in Prairie County. The trail route has been altered through time. Both segments of the trail, the lower Missouri River

and the Yellowstone River, are free-flowing through the planning area.

**Importance Criteria:** The Lewis and Clark National Historic Trail meets importance criteria 1, 2, and 3. The historic and cultural values associated with the trail are fragile, sensitive, rare, irreplaceable, unique and vulnerable to being lost through development. The trail has been recognized as a national priority concern through the development of a comprehensive trail plan by the National Park Service for recognition, protection and interpretation. The trail warrants protection for its cultural and recreation values.

**Summary:** Although the Lewis and Clark National Historic Trail (see maps 31A,B,C,D) meets relevance and importance criteria, the majority of public landownership along the rivers is not contiguous. The cultural values of the trail on public lands can be protected and enhanced without special management attention. Examples of management actions are:

- retain BLM-administered public lands along the trail on both sides of the rivers within the planning area and add to the public land base whenever opportunities exist;

- protect the visual resource and vegetative quality of the river corridors. Sale of wood products, prescribed burns, land treatments or other intrusions on the river banks will not be allowed. The view would be left in a natural state or returned to its natural state whenever possible;

- where feasible access exists, use as an interpretive site area for the Lewis and Clark National Historic Trail with the designated logo.

The Lewis and Clark National Historic Trail is not recommended as an area of critical environmental concern.

**POWDER RIVER DEPOT:** Nominated for unique cultural values.

**Relevance Criteria:** This site meets relevance criterion 1 as a significant cultural resource property. Significant is defined as being both eligible to the National Register of Historic Places and being allocated to conservation use in a cultural resource management plan. This site has important scientific information on the historic use of the area by the late 19th century military. The archeological findings can be compared with written records.

**Importance Criteria:** This site meets importance criteria 1, 2 and 3. The site possesses information that is both regionally and nationally significant. This site is fragile, sensitive, irreplaceable, unique and vulnerable to adverse change, vandalism and unauthorized metal detecting. Natural or man-caused changes could result in the loss of the significant scientific data. In addition, the site warrants being allocated to conservation use, carrying out the mandates of cultural resource protection within Federal Land Policy and Management Act, and the cultural resource management planning system.

Special management attention is needed to study the historic information at the site necessitating preservation of buried deposits, for maximum benefits to the scientific community.

**Summary:** This site qualifies for an area of critical environmental concern under both the relevance and importance criteria. This site (24PE231) is 1,386 acres in size and has been determined eligible for nomination to the National Register of Historic Places. The site is included in T. 11 N., R. 50 E., sec. 4; and T. 12 N., R. 50 E., secs. 26, 27, 28, 29, and 33. The area proposed for an area of critical environmental concern includes Sheridan Butte located along the Yellowstone River, where historic graffiti dating to the Indian War period is on the butte's rock outcrops. The Powder River Depot was the location of General Terry's supply depot that supplied General Custer's troops before they headed to Little Big Horn. It was the main supply depot for the armies that pursued the fleeing Sioux and Cheyenne tribes throughout the summer of 1876. The site contains a wealth of archeological information on the makeup of the encampment and the everyday life of the soldiers of that time period. The numerous buried metallic artifacts are now subject to looting and vandalism through unauthorized metal detecting. A cultural resource management plan is proposed for this site and will take the place of an area of critical environmental concern activity plan. The cultural resource management plan will allocate the site to conservation use.

BLM management objectives should involve the long-term conservation of this site for future generations to study and enjoy. Specific research questions can be formulated whereby artifact and records from the site could be studied and used to demonstrate the historic activities that were present and conducted at the site.

**SELINE SITE:** Nominated for unique cultural values.

**Relevance Criteria:** This site meets relevance criterion 1 as it is a significant cultural resource property. Significance is defined as being eligible for nomination to the National Register of Historic Places, and for allocation to conservation use. This significance is derived from the site's unique properties and information potential that can contribute

important scientific information on cultural traditions from the middle prehistoric period.

**Importance Criteria:** This site meets the importance criteria 1, 2, and 3. It possesses information that is regionally significant, and is fragile, sensitive, irreplaceable, unique, and vulnerable to vandalism and adverse change. Natural or man-caused changes could result in the loss of significant scientific data. In addition, the site warrants being allocated to conservation use, carrying out the mandates of cultural resource protection within Federal Land Policy and Management Act, and the cultural resource management planning system.

Special management attention is needed to preserve the site's buried deposits to provide information to the scientific community.

**Summary:** This site (24DW250) qualifies as an area of critical environmental concern under both the relevance and importance criteria. The site measures some 80 acres in size and is considered eligible for the National Register of Historic Places. The site is located in T. 16 N., R. 57 E., sec. 22. The site possesses important information on prehistory of the Native American in the plains environment. A cultural resource management plan has been written and when updated will take the place of an area of critical environmental concern activity plan. The plan will allocate the site to conservation use.

BLM management objectives should involve the long-term conservation of this site for future generations to study and enjoy. Specific research questions can be formulated whereby artifact and records from the site could be studied and used to demonstrate a number of prehistoric activities that might have been present or were conducted at the site.

**SMOKY BUTTE:** Nominated for unique geological values.

**Relevance Criteria:** Smoky Butte is a 250-foot high prominence located about eight miles west of Jordan in Garfield County, Montana. The Smoky Butte area meets relevance criteria 1 and 3. The area has regionally significant scenic values. It is a landmark feature that can be seen for miles; a striking contrast to the surrounding rolling plains. It was used by early day travelers as a guide when traveling through the area. Pioneers traveling the "Green Trail" west to Lewistown, Montana, could see Smoky Butte for a considerable distance (USDI, BLM 1980a). It is considered to possess significant local and regional scenic and historic values.

The rocks that are present at Smoky Butte consist of a rare mineral assemblage. The area is an excellent example of the geologic process of igneous intrusion.

Smoky Butte is located in the middle of a 2-mile long line of narrow igneous intrusive dikes and plug-like features. These igneous intrusives form a narrow, linear group of low buttes and knobs which rise out of the otherwise rolling prairie and are oriented in a northeast to southwest direction. The igneous rocks were intruded into the flat-lying sedimentary rocks of the Paleocene Fort Union Formation and Late Cretaceous Hell Creek Sandstones and were emplaced along the axis (obliquely) of the Blood Creek Syncline (Mitchell et al. 1987).

The intrusive igneous rocks at Smoky Butte are hard and resist erosion, as do the adjacent sedimentary rocks which were slightly baked and hardened by the hot igneous intrusive. This hardness "holds up" the buttes by providing more resistance to erosion than the surrounding sedimentary rocks.

Although Smoky Butte is an interesting example of igneous intrusion and many geologic features associated with such an event are present there, the primary importance of the butte lies in the unique mineral assemblage of the igneous rocks.

The igneous rocks at Smoky Butte have been categorized as a lamproite which is a type of volcanic or hypabyssal igneous rock. Matson (1958) noted that one of the most striking features of the intrusive rock complex was that the rocks were high in potassium and titanium and are similar to rocks found at West Kimberly, Australia and the Leucite Hills of Wyoming.

Matson (1958) and Velde (1975) observed that the igneous rock is a mixture of minerals. Velde further classified it as an armalcolite-ti-phlogopite-diopside-analcite-bearing lamproite. Velde's analysis revealed that the Smoky Butte lamproite contains a rare mineral called armalcolite, a mineral found in samples of rock from the moon. Velde reported that the armalcolite at Smoky Butte has the closest composition to the lunar armalcolite of any known terrestrial rocks.

In addition, Wagner and Velde (1986) discovered that the mineral davanite, a recently described alkali titanosilicate mineral found in Siberia, is also present in the Smoky Butte lamproite. Smoky Butte contains a rare mineralogic assemblage and is an excellent example of the geologic process of igneous intrusion.

**Importance Criteria:** Smoky Butte meets importance criteria 1 and 2. Smoky Butte has more than locally significant qualities which give it special worth, consequence, and meaning. The special geologic features present have been studied by scientists from the United States, Canada, and France. The Smoky Butte area has been the subject of a Masters of Science thesis study, and a study published by

the U.S. Geological Survey. It has been reported in scientific trade journals, such as American Mineralogist, Journal of Petrology, and Earth and Planetary Science Letters. Smoky Butte is discussed in Mitchell's and Bergman's Petrology of Lamproites, published by Plenum Press, and Alt and Hyndmans' Roadside Geology of Montana, Mountain Press Publishing Company. The area was also the subject of a special field trip of the 28th International Geological Congress studying the Montana High Potassium Igneous Province in July 1989. Information gleaned from these rocks has been used to draw conclusions and advance theories about the origin of the rocks, and the composition and geotectonics of the mantle of the earth.

Scientists believe that the source material for the lamproite at Smoky Butte is mantle derived. This would be deep in the earth's surface since the crust has been estimated to be about 45 kilometers thick in this area (Velde 1975).

The Smoky Butte lamproite is unique because it is the easternmost known intrusive feature in Montana. The nearest intrusive rocks to Smoky Butte occur 55 to 60 miles to the southwest on Porcupine Dome and near Ingomar Dome (Matson 1960). Smoky Butte is also the youngest, dated at 27 million years (Oligocene), and taken together with the Missouri Breaks diatremes, may represent the last phases of igneous activity in the north-central Montana alkalic province (Marvin et al. 1980).

Smoky Butte would be vulnerable to damage from exploration and mining activities carried out under a locatable mineral entry (mining claim). Smoky Butte had been quarried many years ago for riprap for facing a nearby dam. The present quarry site is small and actually provides an excellent exposure of the rocks that make up Smoky Butte. However, further mining activity would not improve viewing or enhance research, and would only serve to destroy the surface exposure of this rare geologic feature.

**Summary:** The Smoky Butte area is 680 acres in size and is located in T. 18 N., R. 36 E, sec. 1: SW/14SE1/4; sec. 11: SE1/4NE1/4, E1/2SE1/4; sec. 12: W1/2NE1/4, NW1/4, N1/2SW1/4, SW1/4SW1/4; and sec. 14: NE1/4. The N1/2 SW1/4 of sec. 12 (80 acres) is public surface and minerals. BLM administers the mineral estate on an additional 200 acres underlying private surface in sec. 11: SE1/4NE1/4; sec. 12: SW1/4NE1/4, S1/2NW1/4; and sec. 14: NE1/4 NE1/4. The remaining 400 acres consist of private surface overlying federal coal only mineral estate. The area requires special management attention. Smoky Butte contains public land with a variety of unique values and needs protection. This public land meets the relevance and importance criteria and is recommended as an area of critical environmental concern.

**ASH CREEK DIVIDE:** Nominated for paleontological values (see map 11).

**Relevance Criteria:** This area exhibits characteristics for consideration as an area of critical environmental concern under the relevance criterion "a natural process or system." The Hell Creek geologic formation and the associated fossils preserve a record of the end of the dinosaur age at the close of the Cretaceous Period. This area preserves a good record of this time period, relatively rare worldwide. The area has produced fossils for display and research, and field studies of depositional patterns and earth history have occurred within the area. The necessary combination of bedrock exposure of the proper age and good preservation of fossils provides research and collecting opportunities rare for this geological time period.

**Importance Criteria:** The Ash Creek Divide area has produced fossils and provided research data that has proven to be significant to the scientific community within the United States as well as worldwide. Comparison of fossils and other data collected here has given scientists insight about the end of the dinosaur age, such as the types of animals and plants present, the environment in which they lived, and the cause of the mass extinction at the close of the Cretaceous Period. This fossil material and information is fragile and needs to be researched in place. In addition, the resource is best served by the public ownership of the land, thereby assuring access by the scientific community.

**Summary:** The Hell Creek Formation is significant for paleontologic resources spanning the time at the end of the Cretaceous Period. The outcrops of these beds are some of the few places in the world that preserve a continuous record just before the mass extinction of the dinosaurs and other forms of life. The Ash Creek Divide area is an example of this record, owing to the good exposures of the bedrock and the preservation of the fossils. Several scientific papers have been written based on research done in this area. The area will continue to provide information as new material weathers out of the rock. This area is recommended for designation as a paleontological area of critical environmental concern.

**BUG CREEK:** Nominated for paleontological values (see map 11).

**Relevance Criteria:** This area exhibits characteristics for consideration as an area of critical environmental concern under the relevance criterion "a natural process or system." The geologic formations and the associated fossils are a rare example of a continuous record of the end of the dinosaur age (Cretaceous Period) and the beginning of the age of the mammals during the Tertiary Period. This area preserves one of the best records of this time period. The area has

produced fossils for display and research. Field studies of depositional patterns and earth history have occurred within the area. The necessary combination of bedrock exposures of the proper age and good preservation of fossils provides research and collecting opportunities rare for this geological time period.

**Importance Criteria:** The Bug Creek area has produced fossils and provided research data that has proven to be highly significant to the scientific community within the United States as well as worldwide. Comparison of fossils and other data collected here has given scientists insight about the end of the dinosaur age and the start of the mammal age, such as the types of animals and plants present, the environment in which they lived, and the cause and effects of the mass extinction at the close of the Cretaceous Period. This fossil material and information is fragile and needs to be researched in place. Special management attention is needed to afford proper protection. In addition, the resource is best served by the public ownership of the land, thereby assuring access to the scientific community.

**Summary:** The Hell Creek Formation and the overlying Tullock Member of the Fort Union Formation are significant for paleontologic resources spanning the time from the late Cretaceous Period to the early Tertiary Period. The outcrops of these beds are some of the few places in the world that preserve a continuous record before, during, and after the mass extinction of the dinosaurs and other forms of life. The Bug Creek area is one of the best and most studied examples of this record, owing to the extensive exposures of the bedrock and the preservation of the fossils. Many scientific papers have been written based on research from this area. The area will continue to provide information as new material weathers out of the rock. Protection of the area is important to preserve the paleontologic values in this significant area. This area is recommended for designation as a paleontologic area of critical environmental concern.

**HELL CREEK:** Nominated for paleontological values and the Hell Creek National Natural Landmark (see maps 11 and 12A).

**Relevance Criteria:** This area exhibits characteristics for consideration as an area of critical environmental concern under the relevance criterion "a natural process or system." The geologic formations and the associated fossils are a rare example of a continuous record of the end of the dinosaur age at the close of the Cretaceous Period and the subsequent beginning of the age of the mammals during the start of the Tertiary Period. This area preserves one of the best records of this time period. The area has produced fossils for display and research. Field studies of depositional patterns and earth history have occurred within the area. The necessary combination of bedrock exposure of the proper age and good preservation of fossils provides research and collecting opportunities rare for this geological time period.

**Importance Criteria:** The Hell Creek area has produced fossils and provided research data that has proven to be highly significant to the scientific community within the United States as well as worldwide. Comparison of fossils and other data collected here has given scientists insight about the end of the dinosaur age and the start of the mammal age, such as the types of animals and plants present, the environment in which they lived, and the cause and effects of the mass extinction at the close of the Cretaceous Period. This fossil material and information is fragile and needs to be researched in place. Special management attention is needed to afford proper protection. In addition, the resource is best served by the public ownership of the land, thereby assuring access to the scientific community.

**Summary:** The Hell Creek Formation and the overlying Tullock Member of the Fort Union Formation are significant for their paleontologic resources spanning the time from the late Cretaceous Period to the early Tertiary Period. The outcrops of these beds are some of the few places in the world that preserve a continuous record before, during, and after the mass extinction of the dinosaurs and other forms of life. The Hell Creek area is probably the best and most studied example of this record, owing to the extensive exposures of the bedrock and the preservation of the fossils. The area has provided museums with displays of dinosaurs and scientific papers based on research from this area. Approximately one-half of the Hell Creek National Natural Landmark is included within the boundaries of this area. The area will continue to provide information as new material weathers out of the rock. Protection of the area is important to preserve the paleontologic values in this significant area. This area is recommended for designation as a paleontologic area of critical environmental concern.

**SAND ARROYO:** Nominated for paleontological values (see map 11).

**Relevance Criteria:** This area exhibits characteristics for consideration as an area of critical environmental concern under the relevance criterion as "a natural process or system." The geologic formations and the associated fossils are a rare example of a continuous record of the end of the dinosaur age at the close of the Cretaceous Period and the subsequent beginning of the age of the mammals during the start of the Tertiary Period. This area preserves a good record of this time period and is relatively rare worldwide. The area has produced fossils for display and research. Field studies of depositional patterns and earth history have occurred within the area. The necessary combination of

bedrock exposure of the proper age and good preservation of fossils provides research and collecting opportunities rare for this geological time period.

**Importance Criteria:** The Sand Arroyo area has produced fossils and provided research data that has proven to be highly significant to the scientific community within the United States as well as worldwide. Comparison of fossils and other data collected here has given scientists insight about the end of the dinosaur age and the start of the mammal age, such as the types of animals and plants present, the environment in which they lived, and the cause and effects of the mass extinction at the close of the Cretaceous Period. This fossil material and information is fragile and needs to be researched in place. Special management attention is needed to afford proper protection. In addition, the resource is best served by the public ownership of the land, thereby assuring access to the scientific community.

**Summary:** The Hell Creek Formation and the overlying Tullock Member of the Fort Union Formation are significant for their paleontologic resources spanning the late Cretaceous Period to the early Tertiary Period. The outcrops of these beds are some of the few places in the world that preserve a continuous record before, during, and after the mass extinction of the dinosaurs and other forms of life. The Sand Arroyo area is a good example of this record, owing to the extensive exposures of the bedrock and the preservation of the fossils. A number of scientific papers have been written based on research done in this area. The area will continue to provide information as new material weathers out of the rock. Protection of the area is important to preserve the paleontologic values in this significant area. This area is recommended as an area of critical environmental concern.

**LIMBER PINE:** Nominated for its unique vegetation (see map 4B).

**Relevance Criteria:** The scattered limber pine stand in the Terry Badlands Wilderness Study Area (3,212 acres) does not meet any of the four criteria for relevance. It is not an endangered, sensitive, or threatened plant species. It is not rare in terms of national or state occurrence. It is not common in the planning area, but does occur in the Missouri River Breaks and outside the planning area near the town of Ekalaka (80 miles south of the Terry Badlands Wilderness Study Area).

**Importance Criteria:** The limber pine stand possesses local significance. Criterion 2 could apply on a local level. Limber pine does occur in other parts of the planning area. Criteria 1, 3, 4, and 5 do not apply.

**Summary:** This area was recommended for special management and protection in the New Prairie Management Framework Plan (USDI, BLM 1981b). On November 30, 1990, data on limber pine was requested and received from the U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Science Laboratory in Missoula, Montana. This information was complied by E. E. Ahleuslager in March 1987, and was entered into the data base for "The Fire Effects Information System" (USDA, Forest Service 1987).

Literature verifies that limber pine is found as far east as North Dakota, South Dakota, Nebraska, and at lower elevations throughout its distribution range. However, limber pine stands are not common in the planning area. The elevational range for limber pine in Montana is around 4,000 feet, and this particular stand is at 2,800 to 3,000 feet. As the management actions for limber pine will adequately protect and preserve this species in the planning area, this area is not recommended as an area of critical environmental concern.

**TEN MILE RIPARIAN AREA:** Nominated for unique riparian values (see map 22).

**Relevance Criteria:** Located in T. 10 N., R. 51 E., secs. 2 and 3 this nomination meets relevance criteria 1 through 3. The area contains some high-yield freshwater springs and related hardwood draws that are not common for this part of semi-arid eastern Montana. The area is uncommon because of the size of the spring area and the volume of water produced. The vegetative community dependent on the presence of this free water is unusually diverse and large for the planning area.

The greatest value of this site is species diversity. The area provides brood-rearing habitat for upland and nongame birds, as well as big game habitat. The fact that the spring area is covered with brush makes it a high-quality watering area and offers escape cover for wildlife.

**Importance Criteria:** This nomination meets importance criteria 1 and 2. The size of the system and the water yield make it significant for vegetation and in terms of wildlife values already discussed under the "Relevance" section. A riparian demonstration area has been managed as a part of Ten Mile Creek since 1988. This management includes additional livestock watering sources, enhancing riparian values and restricting livestock from a 16-acre plot to protect the spring source and associated riparian vegetation. Monitoring has verified this management is effective and enhances the riparian resources. In accordance with BLM policy, riparian areas are managed to restore and maintain riparian/wetland areas so that 75 percent or more are in proper functioning condition by 1997.

**Summary:** Existing management is protecting and enhancing the riparian values of this area; therefore designating the area as an area of critical environmental concern is not necessary.

**BALD EAGLE NESTS:** Nominated for nests for the bald eagle.

**Relevance Criteria:** The mature cottonwood stands associated with the Yellowstone River (shorelines and islands) are potential nesting habitat for the endangered bald eagle.

**Importance Criteria:** Potential habitat for the bald eagle is significant and valuable. This habitat is important since an endangered species of national significance could inhabit it.

**Summary:** Although this area meets the relevance and importance criteria, this nomination is not being recommended. The reason is that currently no bald eagles are known to nest on public land in this planning area. This is not to say that bald eagles will not occupy public land in the future.

**BLACK-FOOTED FERRET REINTRODUCTION AREA**: Nominated as potential black-footed ferret reintroduction area as well as habitat for associated wildlife species (see map 23).

**Relevance Criteria:** Prairie dog complexes of 1,000 acres or more are potential habitat for the black-footed ferret. This area is considered a potential reintroduction area for the black-footed ferret because it has 1,151 public acres of active prairie dog towns. Also the prairie dog complexes provide habitat for associated species. It meets the relevance criteria stated in BLM Manual 1613.1.11A2.

**Importance Criteria:** Habitat for the black-footed ferret is rare, significant, and valuable, and therefore, satisfies the importance criteria (BLM Manual 1613.2 B1-4). This area is important because of its national significance for potential black-footed ferret reintroduction. This area warrants protection under the Endangered Species Act of 1972 and Federal Land Policy and Management Act 1976 guidelines. In addition, prairie dog towns provide habitat for over 30 associated wildlife species, including the burrowing owl (species of special interest), swift fox (category 2 species), and the mountain plover (category 1 species).

**Summary:** The black-footed ferret is an endangered species dependent on prairie dog colonies. Currently, the only black-footed ferrets known to occur in the wild were those released in the Shirley basin of Wyoming in 1991. No other black-footed ferrets are known to exist outside captivity. In order for the black-footed ferret to recover, it will be necessary to establish ten separate self-sustaining colonies. Since there may not be 10 suitable reintroduction sites in the nation, all reintroduction areas are nationally important.

One possible reintroduction site is located in Prairie and Custer counties (Custer Creek site). This area lies west of Terry and is generally comprised of the Hunter and Custer Creek drainages north of the Yellowstone River. This area was chosen because it has 1,151 public acres of prairie dog colonies.

This area meets the relevance and importance criteria and is recommended as an area of critical environmental concern. Over 30 wildlife species are associated with prairie dog towns. In addition to the endangered black-footed ferret, burrowing owls, swift fox, and the mountain plover are associated with prairie dog habitat.

**FOX CREEK:** Nominated for unique fisheries values (see map 26).

**Relevance Criteria:** The unique fisheries values associated with Fox Creek are not present. A perennial stream, with any fish present is somewhat unique in eastern Montana. However, the species of fish present in Fox Creek can be found in other perennial streams within the planning area.

**Importance Criteria:** Fox Creek, although unique for the planning area, is only locally important. For this reason, Fox Creek does not meet the importance criteria.

**Summary:** Fox Creek (T. 23 N., R. 54 E.) was originally nominated for an area of critical and environmental concern in the Redwater Management Framework Plan (USDI, BLM 1983a). Monitoring has determined that the creek does not contain a significant or unique fisheries. It is recommended this site not be considered as an area of critical environmental concern.

**LEAST TERN NESTS:** Nominated for nests of least terns.

**Relevance Criteria:** The gravel islands of the Yellowstone River are potential habitat for the federally endangered least tern.

**Importance Criteria:** These graveled islands are nationally significant in terms of being habitat for the least tern. With the unregulated flows characteristic of the Yellowstone River graveled islands suitable for nesting least terns are rare.

**Summary:** Although this area meets the relevance and importance criteria, nomination as an area of critical environmental concern is not recommended. The least tern,

being somewhat nomadic in its nesting, has not established preference for any specific island. Although least terns are known to inhabit public land, to this date no nests are known to occur on public land.

**PIPING PLOVER SITE:** Nominated for a piping plover nest (see map 27).

**Relevance Criteria:** Since this area is habitat for a threatened species it meets the relevance criteria (BLM Manual 1613.1.IIA2).

**Importance Criteria:** Habitat for the piping plover has substantial significance and value, and thus, satisfies the importance criteria (BLM Manual 1613.2 B1-4). This habitat is important because (1) the area is of regional significance since threatened species inhabit it; (2) saline wetlands are somewhat rare since they are fragile, sensitive, unique, and vulnerable to adverse change; and (3) since a threatened species inhabit this area, this warrants protection under the Endangered Species Act of 1973, as amended and Federal Land Policy and Management Act guidelines.

**Summary:** The piping plover is a threatened species associated with saline wetland, typical of northeastern Montana. This species is protected because it is classified as a threatened species by the Endangered Species Act of 1973, as amended. One parcel of BLM-administered land, described as T. 36 N., R. 58 E., sec. 24, lot 12 and located in Sheridan County is known to contain nesting piping plovers. This parcel of BLM-administered land is 15.51 acres in size and borders a saline wetland near the town of Westby. This site meets the relevance and importance criteria and is recommended as an area of critical environmental concern.